

SPECIAL SPECIFICATION

SECTION 15208S

RECLAIM WATER SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Reclaim Water System for building 858, CUB-1 & CUB-2 Cooling Towers, building 858 and MFAB Scrubbers.
- B. Mechanical equipment located in building 858K (pump house) and Service Yard.

1.02 REFERENCES/PROJECT REQUIREMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of the following Project Specification Sections apply to this section:
 - 1. Section 15050-S– Basic Mechanical Materials and Methods
 - 2. Section 15051-S- Piping Systems
 - 3. Section 15090-S - Polymer Process Piping Systems
 - 4. Section **15070-S** - Vibration Limits and Control
 - 5. Section 15250-S – Pipe and Equipment Insulation for the MicroFab
 - 6. Section 13085-S - Seismic Protection
 - 7. Section 16269 - Variable Frequency Controllers
 - 8. Section 03300-S– Cast-In-Place Concrete
 - 9. **Section 15170-S – Motors**
- C. Refer to control specification for the controls equipment and sensors used in Reclaim System.
- D. Where a conflict occurs between this section and other referenced sections of the specifications, the technical section of the specification shall take the precedence.

1.03 DEFINITIONS

- A. Reclaim Water: Acid Waste Effluent within specified pH range of **6-9** and conductivity levels (**< 900 mS/CM**) is used as make-up water to the Cooling Towers and Scrubbers to conserve well water usage.
- B. N - Number of components required at each unit process to operate system at design conditions.
- C. N+1 - Required number of components for each unit process to be installed to meet redundancy, maintenance and/or other requirements.

1.04 SYSTEM DESCRIPTION

A. Purpose of System:

The system will provide pumped reclaim water to the building 858 and MFAB scrubbers and CUB-1 & CUB-2 cooling tower basins at a constant pressure irrespective of demand variability. The system will also provide gravity fed reclaim water to the building 858 cooling tower basins.

B. System Operating Parameters:

Parameter	Set Point	Operational Tolerance	Monitored By FCS?	Sensor Location
PH	6.0 – 9.0	± 1.5	Yes	AWN Effluent Flume
Conductivity	< 900 μS/CM		Yes	AWN Effluent Flume
Free Chlorine	0.5 PPM	± 0.1	Yes	Well water inlet to Reclaim Storage Tank
Calcium	90 PPM	± 10	Yes	Reclaim water outlet from Reclaim Storage tank
High Alarm Level	6'-0"		Yes	Reclaim Transfer piping sight glass
High/Low Alarm Level	13'-4"/4'-5"		Yes	Reclaim Storage Tank TK-11
Relief Differential Pressure	90 psig		Yes	Relief piping downstream of Reclaim Distribution Pump
Pressure Transmitter	45 psig	± 5 psig	Yes	Utility bridge

Totalizing and flow rate. Point of use Alarm	>5 minutes for reporting alarm		Yes	Well water main 858 cooling tower, CUB-1 & CUB-2, 858 and MFAB scrubbers main
Hardness	50 – 100 ppm		Yes	Reclaim distribution pump discharge in Pump house “K”

C. System Design Criteria:

1. System equipment:

- (a) One 2,600 gallons AWN Effluent Holding Tank (existing).
- (b) Two 375 gpm each AWN Lift Pumps w/standard motors (existing).
- (c) Two 270 gpm each Reclaim Transfer Pumps w/premium efficiency motors and N+1 redundancy.
- (d) Three 20,000 gallons each Reclaim Storage Tanks.
- (e) Two 200 gpm each Reclaim Distribution Pumps w/premium efficiency motors, VFD’s and N+1 redundancy.
- (f) Well water reduced pressure backflow preventers (existing).

2. Reclaim Water Flow Rate (Peak):

- (a) Total peak reclaim water flow rate: 270 gpm
- (b) Backup peak well water flow rate: 270 gpm
- (c) Building 858 Cooling Towers: 96 gpm
- (d) Building 858 Acid and Ammonia Scrubbers: 20 gpm
- (e) MFAB Acid and Ammonia Scrubbers: 30 gpm
- (f) CUB-1 Cooling Towers: 85 gpm
- (g) CUB-2 Cooling Towers: 39 gpm

3. AWN effluent lift pumps run continuously on/off controlled by holding tank

level transmitter. Lift pumps discharge AWN effluent to the overhead sanitary sewer piping main.

4. Reclaim transfer pump runs continuously on/off controlled by holding tank level transmitter and pH and conductivity sensors set points.
5. Level controllers open or close makeup valves to maintain cooling towers basin levels.
6. Reclaim distribution pumps controlled by line pressure, which is set at 45 psig. Pressure transmitter, located on the utility bridge piping, controls the variable frequency controllers through the FCS.
7. Solenoid valve located downstream of reclaim distribution pumps set at differential pressure of 90 psig to relief system excessive pressure.
8. Upon a pressure drop below (adjustable set point) 45 psig, pressure transmitter shall send an alarm to the FCS, stop reclaim distribution pump (s) and open automatic control valve, allowing non-potable well water to supply required flow and pressure through pressure control valve.
9. Upon a low reclaim storage tank level (36" from bottom of tank), level transmitter shall shut off reclaim distribution pump, and open automatic control valve, allowing non-potable well water to supply required flow and pressure through pressure control valve.
10. Upon a rise in tank water level, level transmitter shall start reclaim distribution pump and close automatic control valve.
11. Excess reclaim water in the storage tank will overflow from tank to the sanitary sewer.
12. Totalizing flow meter located in the well water backup piping report the reclaim system is off and calling for well water backup through the FCS.
13. Totalizing flow meter located in the reclaim piping reports the point of use flow through the FCS.
14. Hardness Analyzer, located in the pump house "K" provides two points of reference, along with the alarming capabilities for proper water quality control.
15. Utilities:
 - (a) 480 V for pumps
 - (b) 120 V for controls.

D. Reclaim Storage Tank Design Criteria:

1. Tanks shall be designed, fabricated, and inspected in accordance with the latest issue of the following standards:
ASTM C581 "Chemical Resistance of Thermoset Resin"
ASTM C582 "Reinforcement of FRP Tanks"
ASTM D3299 "Construction of FRP Tanks"
2. FRP tanks shall be constructed using zero-to-90 degree CHOP-HOOP filament winding techniques. FRP tanks fabricated using hand lay-up techniques are not acceptable.
3. Tank nominal capacity 20,114 gallons each, 1.3 specific gravity and seismic zone 2B.
4. Tank resins material shall be acceptable commercial-grade suitable for intended service.
5. Post curing of the FRP laminate (if necessary) shall consist of a cure temperature of at least 180 degrees F for a minimum of 4 hours. Hot air curing is preferred.
6. Temperature of laminates and materials shall be maintained between 60 and 95 degrees F during fabrication. Temperature must also be at least 5 degrees above dew point.
7. FRP tanks shall be corrosion-resistant to the specified tank contents and shall be suitable for the intended service life.
8. FRP tanks shall have roofs capable of withstanding an external uniformly distributed loading of 50 pounds per square foot, and a point loading of 500 pounds on the tank dome.
9. Tank Tie-Down System: Tie-down lugs shall be galvanized steel. Provide an adjustable location tie-down system consisting of a continuous exterior ledge at the side shell/bottom knuckle and cantilever anchor dogs.
10. Lifting Lugs: Closed-top tanks shall be provided with at least four lifting lugs equally spaced and incorporated into the straight sides at the tank top knuckle. Lifting lugs shall be designed to limit flexing when used to lift the tank vertically or horizontally. Lifting lugs shall be of manufacturer's design, using heavy-duty galvanized steel. Follow fabricator's handling recommendations.
11. Nozzles and manways shall be fabricated per ASTM D3299 and in compliance with ANSI B.16.5 for ANSI Class 150 flanges, and shall have at least a 25 psig

rating. All nozzles shall be single-piece construction, contact molded by hand lay-up. Slip-on flanges are not permitted. Machine facing of the back of the flanges is not permitted. Nozzles shall not extend beyond the tank interior surface.

12. Nozzles, sized eight inches and under shall be reinforced with flat plate gussets with a thickness of at least 3/8-inch.
13. Gaskets: Provide EPDM gaskets as shipping gaskets for each nozzle and manways. Provide two service gaskets for each manways. The installation contractor shall provide all other service gaskets.
14. External nozzle projections shall be a minimum of six inches as measured from the back ace of the flange to the external surface of the tank wall.
15. Dimensional Requirements: Cylindrical Vertical Non-Pressurized Tanks - Diameters shall be measured internally. Tolerance on nominal diameter including out-of-roundness shall be plus or minus 1 percent. Measurements shall be taken with the tank in the vertical position. Taper shall not exceed 0.25 percent per side. Tolerance on overall height shall be plus or minus 0.5 percent, but shall not exceed plus or minus 3/4 inch. Domed heads shall be designed in accordance with ASTM D3299.
16. Provide OSHA standard fiberglass ladder and cage. Ladders shall secure to the tank wall by bolting to an "L" shaped mounting lugs bonded permanently to the tank. Ladder dimensions shall be following:
 - Total ladder length: 29 feet
 - Total cage length: 22 feet
 - Maximum center to center distance on mounting lugs: 6 feet
 - Number of pairs of lugs: 5
17. Provide appropriate openings as detailed on the drawings. The final locations of nozzles and accessories shall be subject to change until shop drawing approval.
18. All FRP tanks shall be designed for outdoor service with direct sunlight exposure.
19. The tank exterior gel-coat or epoxy system shall include UV protection.
20. Nameplates: Attach a permanent weatherproof equipment identification label to each tank. The label shall be resistant to chemical corrosion. The label shall state the following information:
 - (a) Equipment identification number
 - (b) Capacity in U.S. gallons

- (c) Name of manufacturer
- (d) Manufacturer serial number
- (e) Year built
- (f) Tank weight (empty)
- (g) Tank loading capacity

1.05 SUBMITTALS

- A. Submit under provisions of Sections 01300-**S** and 15050-**S**.
- B. Shop Drawings: Indicate dimensions, sizes, weights and point loadings, material thickness, and locations and sizes of field connections. Submit construction layout and details.
- C. Product Data: Provide manufacturer's literature and data indicating rated capacities, dimensions, weights and point loadings, accessories, electrical requirements and wiring diagrams, and location and sizes of field connections.
- D. **Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Submit a certified shop performance test curve indicating capacity, head, horsepower and flow rates from shutoff to 125 percent of design flow.**
- E. **Submit a certification that pumps impeller is less than 85 percent of the diameter of maximum impeller possible for the pump casing, and that fabricated base plate is of sufficient strength to prevent vibration, warping or misalignment of the pump.**
- F. **Provide pump operation and maintenance manual.**
- G. Manufacturer's Installation Instruction: Indicate assembly and installation instructions. Interior surface veil thickness and composition.
- H. Manufacturer's product data for reclaim storage tank shall include:
 - 1. Per Diem rates for additional days of onsite installation supervision.
 - 2. Description of quality control program.

3. Fabrication schedule and location of fabrication
 4. Cleaning procedures
 5. Proposed empty weight for equipment
- I. System Startup plan to include:
1. Cleaning and flushing procedures.
 2. System filling procedure.
 3. Position of all automatic and manual valves.
 4. Verification of pump rotation, electrical requirements and VFD control.
 5. Final leak check.
 6. System performance curve.
 7. Upon completion of construction, submit plan for flushing and cleaning of system prior to start-up.

1.06 QUALITY ASSURANCE

- A. Provide highest quality and reliability with latest proven technology; utilize total cost of ownership concepts.
- B. Comply with applicable environmental and safety regulations.
- C. Maintain high level of communication with Owner on all levels of project.
- D. Assign an individual solely responsible for quality control functions, resident on job site. Quality control functions to include as a minimum cleanliness checks, component inspection, pipe welding, craftsmanship inspections, and certification. Maintain incoming quality control records for audits by SNL.
- E. Provide skilled laborers certified in their trade.
- F. Provide training and instruction of pipe joining techniques for personnel assigned to make such joints. Include training and certification by pipe manufacturer for joining technique selected. Include random inspections by representative of pipe manufacturer to ensure quality of joint on a daily basis.
- G. Coordinate with SNL for source inspections at manufacturer's factory or assembly plant prior to shipping equipment.

1.07 DELIVERY/SHIPPING, STORAGE, AND HANDLING

- A. The Contractor shall provide his own storage space for protection and storage of his material and assume complete responsibility for all losses due to any cause whatsoever.
- B. In no case shall storage interfere with traffic conditions in any public or project thoroughfare.
- C. Contractor shall be responsible for safe handling of all equipment and shall replace, without charge, all items damaged prior to acceptance by the SNL.
- D. All storage shall be within the property lines of the building site, and/or as directed by the SNL.
- E. Preparation for Reclaim Storage Tanks Shipment:
 - 1. In addition to any special requirements for shipping, handling, storage, and protection provided in this Specification, the tanks shall be prepared and protected for shipment and shipped as specified in ASTM D3299.
 - 2. Prior to inspection and loading, all dirt and extraneous materials shall be removed from the tank interior. All exterior surface markings, coatings, or contaminants shall be removed prior to shipment.
 - 3. Tanks shall be rinsed with potable water followed by wipe-down with clean, lint-free towels. After cleaning and drying, tank nozzles and openings shall be sealed with EPDM gaskets and bolted ANSI Class 150-pound thermoplastic blind flanges. A single opening shall be provided on each tank to accommodate temperature changes during shipping. Protect the opening from dirt, moisture, and rain that may be experienced during the transport of the tank to the jobsite.
- F. Reclaim Storage Tanks Packing and Loading:
 - 1. Tanks shipped in the horizontal position shall be mounted on padded cradles at least 6 inches wide for up to 8-foot diameter and 12 inches wide for larger diameter tanks. Cradle padding shall contact each tank along at least 20 percent of the exterior circumference. At least 4 inches of high-density foam rubber or Styrofoam padding shall be used to protect tanks. All tank end blocking used to prevent shifting of tanks during transit shall be padded and bear only upon the knuckle radius of flat or dished heads.
 - 2. Tanks shall be secured to prevent rotation or other movement with cloth webbed strapping at least 3 inches, and preferably 6 inches wide. Padded metal strapping of equal width is also acceptable.

3. For tanks shipped in one piece, tie-down straps shall not be tightened to the point where the tank is oblate.
4. Pipe, tubing, fittings, gaskets, bolts, or any other small miscellaneous parts and accessories shall be padded and packaged in a crate or box and shall be shipped separately. Ladders do not need to be crated.
5. Provide additional protection, such as battens, end wrapping, or other interior fastening, as required to ensure that the tanks are not damaged during shipment.
6. Exterior fittings, such as nozzles and tie-down lugs, shall be padded and prevented from impact or any stress loading during shipment.

1.08 PROJECT/SITE CONDITIONS OR SPECIAL CONDITION

- A. Power for Pumps: 480 VAC, 3 phase, 60 Hz.

1.09 SEQUENCING

- A. The contractor shall refer to other parts of these specifications covering the work of other trades that must be carried on in conjunction with the mechanical work, so that the construction operations can proceed without interference or delay.
- B. The Reclaim System Upgrade can be constructed in phases to conserve neutralized acid waste as much as possible and to minimize the use of back-up city water. Refer to construction drawings for the phased construction sequencing.

1.10 SCHEDULING

- A. The Contractor shall not interrupt any main interior or exterior mechanical utility without written request for an outage and a subsequent approval of **Sandia Delegated Representative**.
- B. The reclaim system upgrade can be constructed in phases or can be completed during a scheduled winter holidays outage (typically Dec. 24th through Jan 1st). Reclaim system shutdowns are permitted during non-standard hours work, coordinate system shutdowns with the Sandia delegated representative 2 weeks in advance.
- C. Provide temporary non-potable water to the existing building 858 cooling tower sumps (96 gpm max) and 3 each exhaust scrubbers (15 gpm total) during the scheduled reclaim system upgrade outages affecting reclaim water availability.

D. Special Openings:

The Contractor shall schedule delivery of all large equipment requiring special openings for installation prior to enclosing of area.

1.11 SYSTEM STARTUP

- A. Review and verify plan and schedule with Owner to conduct system startup at least two weeks prior to anticipated startup date.
- B. Execute startup plan with Owner in attendance.

1.12 OWNER'S INSTRUCTIONS

- A. not used

1.13 COMMISSIONING

- A. not used

1.14 MAINTENANCE

- A. Operation Data: Include instructions for lubrication, motor and drive replacement, spare parts lists, and wiring diagrams.

1.15 PROJECT RECORD DOCUMENTS

- A. Include test and start-up documentation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Reclaim Storage Tanks: Design Tanks, Inc. Sioux Falls, SD or approved equal
- B. Pump: Fybroc.
- C. Pump Motor: Equal to Baldor
- D. Butterfly & Ball Valves (Plastic): Hayward, Fisher, Asahi or approved equal.
- E. Butterfly Valves (Metal): Centerline, Grinnell, Keystone or approved equal.
- F. Check Valves (Plastic): Hayward, Fisher, Asahi or approved equal.
- G. Check Valves (Metal): Technocheck, Keystone or approved equal.

H. Pressure Sustaining Valve: CLA-VAL.

I. Pressure Control Valve: CLA-VAL

2.02 EXISTING PRODUCTS

A. AWN Effluent Lift Pumps: Quantity: 2. Fybroc series 1500 size 4x410

B. Holding Tank: AWN Effluent 2,600 gallons capacity Carbon Steel Lined.

C. Reduced pressure backflow preventers for non-potable water service to make-up water and pumps mechanical seals flushing.

D. Float control valves for building 858 east and west cooling tower basins.

2.03 MATERIALS

A. Pipe and Fittings:

1. Where indicated on drawings, reclaim piping, valves and fittings shall be schedule 80, CPVC, socket end. Pipe valves, fittings and cement to conform to ASTM-D-1784 (physical and chemical properties), ASTM-F-441 (CPVC pressure piping), ASTM-F-438 (CPVC pressure fittings), and ASTM-F-493 (solvent cement). Use factory made tees and long radius elbows. Mitered elbows and saddle type tees are prohibited.
2. Where indicated on drawings, well water piping shall be type "L" hard drawn copper tubing, ASTM B88. Pressure fittings shall be ANSI B16.22 wrought copper and copper alloy solder-joints. Solder metal to conform to ASTM B32 and soldering to conform to ANSI/ASME B 31.1 Power Piping.

B. Valves:

1. Ball Valves (Plastic): Sizes 2 inch and smaller. True union ball type, CPVC body w/viton elastomer seal.
2. Butterfly Valves (Plastic): Sizes greater than 2 inches. Lug type, CPVC body and disc w/viton liner and seal. Lever handle rated for bubble tight shut off at 150 psig.
3. Butterfly Valves (Metal): Sizes greater than 2 inches: Lug type, bronze body, all wetted parts stainless steel w/EPDM liner and seal. Lever handle rated for bubble tight shut off at 150 psig.
4. Check Valves (Plastic): CPVC swing check valves, viton seal, pressure rating 100 psig, equal to Ryan Herco 5139.

5. Check Valve (Metal): spring type, stainless steel lug w/body, hinge, seat, and spring and disk stainless steel.
6. Pressure Sustaining Valve: Hydraulically operated, diaphragm actuated, globe pattern, 4"-150# flanged connection. Valve body and trim shall be bronze. Pilot adjustable range to be 20 – 200 PSIG . CAL-VAL Model 50-01 w/ CAL-VAL Model 100-1 Hytrol valve, strainer, needle valve and pressure relief control.
7. Pressure Control Valve: 2"-NPT, bronze body, stainless steel strainer and stem, reinforced neoprene diaphragm w/ adjustable range 8 – 80 psig. The balanced direct acting pressure reducing valve with check features shall be A.S.S.E. approved standard 1003. Valve shall be CLA-VAL Model 990 or approved equal.
8. Automatic Control Valves with Actuator: Refer to control specification
9. Solenoid Valve: Refer to control specification
10. Valves to meet ANSI Class 150 otherwise indicated.

C. Insulation:

1. Conform to Special Specification 15250-S.
2. Heat trace **and insulate** all exterior pipe and fittings. Use thermocouple sensing to maintain maximum temperature of 70 °F. Heat trace sensor shall be equal to Chromalox Model RBF.
3. Paint all exterior pipe and fittings white with heavily pigmented, exterior water base latex. The latex paint must be applied thick enough to make an opaque coating.

D. Local Indicators:

1. Pressure indicators: Industrial, stainless steel bayonet ring case, SS wetted parts, Glycerin filled - 4" dial,
2. Balancing Flow meters: Heavy-duty 10" scale, industrial rotameter, 304 stainless steel case and cover. Vertical mount 1" PVC fittings, full polycarbonate safety shield, full scale flow 0 – 26 gpm (water), accuracy $\pm 1\%$ full scale, calibrated. Equal to Ryan Herco 5840-133.

- E. Elastomers: Provide full face, EPDM gaskets at flanges and other required locations.

F. Strainers:

1. Well water piping - copper: Flanged ends, cast iron body and bolted cap, 20 mesh Monel screen for water service. Spirax-Sarco Type CI-125.
2. Reclaim water piping – CPVC: Socket end, CPVC body, viton O-ring seal, 20 mesh perforated CPVC screen, 150 psi pressure rating for water service. Equal to Ryan Herco 5321.

G. Flexible Connection:

. Flexible connector reducer. EPDM w/Kevlar reinforcement. Rated operating pressure at 150 psig. Equal to Mason Safelex Model SFDCR

2.04 **MANUFACTURED UNITS**

- A. **Reclaim Storage Tanks: Provide three (3) un-insulated, vertical fiberglass tanks with flat bottom and closed domed top. Tanks shall be non-pressurized. The tanks shall be designed and constructed per design criteria of this specification. The tanks manufacturer shall be Design Tanks, Inc., Sioux Falls, SD, or approved equal.**

2.05 **EQUIPMENT**

- A. **Reclaim transfer pumps: Provide 1 centrifugal, horizontal base mounted, single stage, top vertical discharge, end suction, fiberglass reinforced casing and impeller, oiler-lubricated inboard and outboard ball bearings, woods type SC spacer coupling w/ coupling guard, SS shaft, external flush pump w/ FRP base plate. Fybroc series 1500. Pump is to be coupled to 1500 rpm and 15 hp premium efficiency electric motor w/NEMA frame 254T. Motor shall be equal to Baldor EM233T-8. Set pump on an existing concrete housekeeping pad. Contractor to provide an identical spare pump and motor assembly to meet N+1 redundancy.**
- B. **Reclaim distribution pumps: Provide 2 centrifugal, horizontal base mounted, single stage, top vertical discharge, end suction, fiberglass reinforced casing and impeller, SS shaft, external flush pump w/ FRP base plate. Fybroc series 1530. Pumps are to be close-coupled 3500 rpm and 20 hp, open drip proof premium efficiency electric motor w/NEMA frame 254JM. Motor shall be equal to Baldor EJMM2514T. Set pump on a new concrete housekeeping pad. These pumps will have variable frequencies controllers (VFC). Refer to section 16269-S for VFC requirements.**

PART 3 – EXECUTION

3.01 INSTALLATION

A. Reclaim Storage Tanks:

1. Tanks shall be installed according to manufacturer's recommendations.
2. Do not use the tanks tie-down lugs as lifting lugs. Follow manufacturer's handling recommendations.
3. Set tanks set on a ¾" neoprene pad (Rubatex 451). The installation contractor shall provide neoprene pads.
4. During installation of the tanks, care shall be taken to prevent contamination of the interior of the tank. Nozzles and manways shall be covered except when work is being done on the tank. At least one nozzle shall remain open to prevent pressure buildup in the tank.
5. Entry into the tanks shall be minimized. Written permission shall be obtained at least 24 hours prior to entering a tank located on SNL property. When working in tanks, care shall be taken not to damage the interior surfaces. The floor shall be covered with padded blankets or similar protection. Protection shall be provided between the tank surface and the ladder. Ladders shall not be used in tanks unless written permission is obtained from Khan.
6. Tanks are considered a confined space. A confined space entry permit shall be obtained, and all SNL confined space entry procedures shall be followed.
7. Tanks shall be **hydro tested** in the field after installation.
8. Once a tank is installed vertically on a tank pad, immediately install a minimum of four tie-down lugs to prevent the tank from blowing over.
9. During normal installation, anchor bolts shall be finger tight while the tank is empty.
10. The Contractor and SNL shall inspect the tank after completion of field assembly and testing and prior to field cleaning.
11. The installation contractor shall provide and install the service gaskets for all nozzles and exterior connections, with the exception of the manways gaskets, which will be provided by the tank manufacturer.

- B. Provide required pipe hangers, support rods, anchors, and other components for installation of complete system. See Section **15070-S** for additional requirements.

- C. Provide pipe labels, valve tags, and framed system schematic. Pipe labels shall be of owner approved type, style, and size. Place labels every 20 feet, at each valve, tee, and elbow and on each side of wall penetration.

Pumps:

- 1. Install pump on concrete housekeeping pad. Provide each pump inlet and discharge pipe with a flexible connector reducer rated for 150 psig operating pressure.
- D. System Pressure Control: Maintain 45 psig line pressure on 4" main in the utility bridge prior using variable frequency drive pump.
- E. Install control contractor furnished automatic flow control valve on well water make-up piping to reclaim storage tank.
- F. Install control contractor furnished automatic flow control valve on well water bypass piping.
- G. Install pressure sustaining valve set at 60 psig on well water piping.
- H. Install pressure sustaining valve set at 20 psig on well water piping to storage tank.
- I. Install control contractor furnished solenoid valve set at 90 psig differential on pressure relief piping downstream of reclaim distribution pumps.
- J. Install one pressure control valve on 2" reclaim piping for MFAB scrubbers.
- K. Pressure transmitters and totalizing Flow Meters : Coordinate with control contractor for the transmitter locations on the piping. Install fittings for sensors as required.
- L. Hardness Analyzer: Install control contractor furnished hardness analyzer on the piping in pump house "K".
- M. **Install balancing flow meters on vertical piping near MFAB scrubbers inlets**
- N. **Local Indicators: Install in following locations:**
 - 1. Pump inlet and outlet.
 - 2. Downstream of pressure sustaining and control valves
 - 3. CUB-1 & CUB-2 sumps inlet
- O. Install heat trace on all exterior water piping. Coordinate with electrical for power to heat tracing.

P. Insulation:

1. Insulate all exterior piping with **owner-approved** insulation and jacketing. Refer to Specification 15250-S.

Q. Back welding or thermal fusion not allowed on CPVC piping..

R. Pipe, Valves and Fittings:

1. Do not use pipe couplings in straight runs of CPVC pipe less than 20 feet in length.
2. Cap, plug, or blind flange unused valves.
3. Install isolation valves at pump inlets and outlets.
4. Install isolation valves upstream and downstream of flow control valves.
5. Install isolation valves upstream and downstream of pressure sustaining valve.
6. Install isolation valves upstream and downstream of solenoid valve.
7. Install isolation valves for all local pressure indicators.

S. Prime and paint non-insulated hangers, supports, and other components unless otherwise specified. Paint insulated components.

T. Provide clearance around and under equipment for maintenance.

3.02 TESTS

A. General:

Before insulation is applied, all piping, equipment, and accessories installed under this contract shall be inspected and hydro tested by the Contractor in the presence of the Sandia Delegated Representative (SDR) and approved before acceptance. The Contractor shall furnish all labor, material, and equipment required for testing. The Contractor shall be responsible for all repairs and re-testing as required. All instruments and other equipment whose safe pressure range is below that of the test pressure shall be removed from the line or blanked off before applying the tests. Prior to performing tests, all lines shall be blown free of all loose dirt and foreign particles. The lines shall then be thoroughly flushed with water (liquid lines only) or compressed air (for gas lines) at a sufficient flow rate and period of time to insure complete cleaning on the line of all dirt, scale, and foreign matter. Cleaning and flushing of the lines shall be subject to approval by the SDR. After testing and flushing lines, all filters and strainers shall be cleaned.

B. Testing:

Reclaim water piping shall be tested hydrostatically at the test pressures specified and shall show no drop in pressure in a 2-hour period.

C. Test Pressures:

Hydrostatic test pressure for the reclaim system shall be 100 PSIG.

END OF SECTION